# INDEX.

#### ACKENHEIL.

ACKENHEIL, C .- Discussion by, 73. Adams, Julius Le Roy.—Admitted as

Junior, 1, 58.

Adams, J. W.—Discussion on Proposed Amendments to Constitution, 17; elected Honorary Member, 103.

AINSLIE, GEORGE. - Death announced, 66.

ALLEN, KENNETH. - Admitted as Member, 68, 69.

ALLEN, T. W .- Admitted as Junior, 107.

AMBROSE, W. C .-- Admitted as Member, 65, 66. Amweg, F. J.—Admitted as Member,

61, 63. Anderson, Latham. - Admitted as

Member, 68, 69. Angles of Railroad Turnouts, Method of Determining, 104.

Annan, C. L.—Admitted as Member, 82.

Annual Meeting.—See Minutes of Meetings.

APPLETON, NATHAN. - Discussion by,

Aqua Ammonia Engines, 85.

ASPINWALL, THOMAS. - Admitted as Member, 68, 69.

Automatic Waste Weir, by A. D. FOOTE,

BABCOCK, HENRY N .- Discussion on Proposed Amendments to Constitution, 14.

Badge of the Society-Communication in regard to depositing in Numismatic Collection of National Museum, 108.

Bainbridge, F. H.—Admitted as Junior, 1, 58.

Baker, I. O.—Discussion by, 77.
Baker, Wm. L.—Death announced,

BALDWIN, W. H .- Admitted as Member, 72, 73.

BALDWIN, W. J .- Admitted as Member, 85, 95.

Barlow, J. Q.—Admitted as Member,

BARR, J. N.-Admitted as Member, 103, 104.

## BASSEL.

Bassel, Robert,—Admitted as Member, 68, 69.

Bassett, C. P.-Admitted as Member,

103, 105. Bench Marks—Experiments on Stability of, 98.

Bensel, J. A.—Paper by, 98; Discussion by, 98.

Benzenberg, George H.- Presides at Convention, 75; Discussion by, 75, 77.

BERESFORD, FRANK.—Death announced, 59.

Berg, L. Dec.—Admitted as Asso-

ciate, 72, 74.
BIXBY, W. H.—Discussion by, 86.
BLACK, W. M.—Admitted as Member, 72, 73,

Blackford, F. W., Jr.-Admitted as Member, 65, 66.

Board of Direction.—Report of, 44. John.—Elected Secretary and Librarian, 30; Discussions by 66, 69, 73, 77, 86, 98, 99, 104, 108; Description of Lift Bridges on Canals of New York State, 108.

Boller, A. P.—Discussion by, 86. Bolton, Channing Moore.—Admitted as Member, 1, 57.

BOOTH, W. H.—Admitted as Member, 82.

Bovey, Professor, H. T.-Discussion on Classifications of Membership, 32.

BRACKETT, Dexter.—Admitted Member, 72, 73.

Breen, Howard.—Admitted as Member, 65, 66.

Brendlinger, P. F.—Discussions by, 99, 107. Brick Industry about New York City,

Brick Making in Sinaloa, Mexico, 77.

Brick, Manufacture of, near Chicago, by D. V. Purington, 66. Brick, Slate, Manufacture of, by José

R. VILLALON, 66.

Bridges, Long Span, Discussion on, by G. LINDENTHAL, 1.

Bridge over Arkansas River, Construction of; Paper and Discussion

Bridge, New Transfer, at Harsimus Cove, Jersey City, 98.

## BRIDGE.

Bridge Trusses, Weights of, 77.
Brinckerhoff, H. W.—Discussions
by, 63, 69, 86, 99, 104, 108.

Brinsmade, D. S.—Admitted as Member, 59, 60.

Brooks, Frederick.—Discussion on Proposed Amendments to Constitution, 16; Paper by, 104.

Brown, E. L.—Admitted as Member, 85.

Brush, C. B.—Elected Director, 30; Discussion on Proposed Amendments to Constitution, 30, 35; on Committee on Amendments to Constitution, 38; on Committee on Finance, 43; Discussions by, 59, 63, 75, 76, 99.

Buck, L. L.—Discussions by, 63, 99, 108.

Budde, O. C. E.—Admitted as Member, 82.

Bullock, W. D.—Admitted as Member, 82.
Burbank, G. B.—Admitted as Mem-

ber, 82, 83. Burgwyn, C. P. E.—Discussion by,

BURR, WILLIAM H.—Discussion on Proposed Amendments to Con-

stitution, 23.
Burrowes, F. S.—Admitted as Mem-

ber, 72, 73. Bush, H. D.—Admitted as Member,

68, 69.
BUTLER, M. J.—Discussion on Proposed Amendments to Constitution, 7.

CAIN, WILLIAM.—Admitted as Member, 103, 105.

CARLL, D. S.—Admitted as Junior, 61, 64.

Carpenter, C. A.—Admitted as Member, 68, 69.
Carroll, Eugene.—Admitted as Ju-

nior, 1, 58. Carter, E. C.—Admitted as Mem-

ber, 65, 66.

CARTER, O. M.—Admitted as Member,
61, 63: Discussion by 86.

61, 63; Discussion by, 86. CARTWRIGHT, ROBERT.—Discussion by,

Cass, George W.—Death announced, 65.

CHIPMAN, WILLIS,—Admitted as Member, 72, 73.

CHITTENDEN, S. H.—Paper by, 59. CLAPP, L. R.—Admitted as Member, 59, 60.

## CLARK.

Clark, W. G.—Admitted as Junior, 65, 67.

CLARKE, H. W.—Discussion on Proposed Amendments to Constitution, 14.

Clarke, St. John.—Admitted as Junior, 85, 95.

CLARKE, T. C.—Discussion by, 104. Codwise, E. B.—Admitted as Member, 85, 95.

COFFIN, AMORY.—Discussion on Proposed Amendments to Constitution, 12.

COHEN, MENDES.—Elected Director, 30; Discussion on Proposed Amendments to Constitution, 18, 31, 36; on Committee on Finance, 43; Presides at Meeting, 61.

Collingwood, F.—Discussions by, 69, 77, 86, 104, 108.

Colne, Charles.—Discussion by, 65. Columns, Z-Iron, 78.

Committée on Compressive Strength of Cements and Compression of Mortars, and Settlement of Masonry, 38, 81.

-To Consider Resolution offered by Special Committee on Uniform Standard Time, 103, 104.

 On Finance, 2, 43, 53.
 On Grades and Titles of Engineers on Public Works, 4, 81.

-On Library, 43.

On Nominations, 82, 89.On Plan for Creating a Library for

Joint Use, 2, 3.

On Proper Relations to Each Other of the Sections of Railway Wheels and Rails, 3, 81.

-To put in Proper Form for Letterballot Proposed Amendments to Constitution, 38, 39.

—(Special) on Standard Time, 83.
 —On Subscriptions to Building Fund,
81.

-On Uniform Standard Time, 2, 54,

Comstock, C. B.—Discussion by, 99. Conduit, 30-inch, Wooden, Described by EDWARD PRINCE, 63.

Conver, A. D.—Discussion by, 77. Constitution, Amendment as to Expulsion from Society, 62.

 Amendment as to Proposals of Foreign Engineers, 62.
 Amendments Proposed, Discussion

on, 7.

—Result of Letter-ballot on Amendments, 61.

#### COOLEY.

Cooley, G. W.-Paper by, 98.

THEODORE. - Discussion on COOPER, Proposed Amendments to Constitution, 20, 26; on Committee on Amendments to Constitution, 38; Discussions by, 66, 69, 98, 107,

Cornell, A. L.—Admitted as Junior, 65, 67.

CRAFTS, G. H.—Admitted as Associate, 65, 67.

CRAIGHILL, W. P.—Paper by, 76. CRAVEN, ALFRED. - Admitted as Mem-

ber, 107, 108. wford, William.—Admitted as CRAWFORD,

Member, 103, 105. Croes, J. J. R.—Elected Vice-President, 30; on Committee on Library, 43; Discussion on Proposed Amendments to Constitution, 7, 21; Presides at Meeting, 59, 66, 68, 69, 72, 80, 85, 98, 103, 104, 107; Discussions by, 59, 73, 75,

98, 99, 104, 108. Curtis, W. W.—Admitted as Member, 85, 95.

Cushing, S. B.—Death announced, 107.

Dagron, James G. - Discussion on Proposed Amendments to Constitution, 14.

DARRACH, CHARLES G.—Remarks on Proposed Amendments to Constitution, 13.

Davis, F. P.-Admitted as Member, 59, 60.

DAVIS, J. P.—On Committee on Amendments to Constitution, 38; Discussions by, 66, 73, 104, 108.

DELAFIELD, CLARENCE.—Admitted as Member, 59, 60.

DEMPSTER, ALEXANDER. — Discussion by, 77; on Committee on Nominations, 82.

Dennis, W. F.-Admitted as Member. 59, 60.

DEYO, S. L.-Admitted as Member, 72, 74.

D'INVILLIERS, C. S.—Admitted Member, 1, 57,

Dodge, J. T.-Paper by, 76; discus-

sion by, 77.
Donovan, J. J.—Admitted as Member, 65, 66.

Dorsey, E. B.—Paper by, 107. Downes, S. B.—Discussion by, 76. Du Bois, A. J.—Paper by, 77.

#### DUNLAP.

DUNLAP, DE CLERMONT.—Admitted as Member, 1, 57.

Durability of Timber, Discussion on,

Edwards, N. M.—Discussion by, 77. Electric (Edison Incandescent) Lighting Plant.-Test of, by J. W. HILL, 63.

EMERY, C. E.—Discussion by, 66, 69,

EMONTS, W. A. G.—Death announced, 65.

Engineering Titles. - Ambiguity in, 3. English Railroad Track, 76.

Enlargement of the Society House considered, 108.

Ernst, O. H.—Admitted as Member, 82, 83,

European Trip, Letter in regard to, 108.

Evans, G. E.-Admitted as Member, 68, 69,

Fanning, J. T.—Discussion by, 75. Mark. — Admitted FARGUSSON, Junior, 107, 109.

FARLEY, J. M.—Admitted as Junior, 107, 109.

FIELD, B. K.—Discussion by, 63. H.-Death FISHER. CHARLES nounced, 59.

FISHER, E. A.—Admitted as Member, 82, 83.

FISHER, F. D.—Admitted as Member, 68, 70.

FITZGERALD, D.—Discussion on Proposed Amendments to Constitution, 28, 29, 34, 37, 38; Member of Committee to urge Congress to Provide Gauges for Rain-fall, 39.

FLAD, EDWARD. -Admitted as Member, 59, 60.

FLAGG, J. F .- Paper by, 65; Discussions by, 59, 63, 66, 86, 104, 108.

FOOTE, A. D. -Paper by, 73. Francis, G. B .- Admitted as Member, 103, 105.

Francis, H. N.—Admitted as Member, 103, 105.

Francis, James B .- Paper by, 69; Discussions by, 69, 77, 99.

FREEMAN, G. W.—Admitted as Member, 107.

FRIZELL, J. P.—Discussion by, 69. FTELEY, ALPHONSE. - Elected Director, 30; on Committee on Library, 43;

Presides at Meeting, 73; Discussions by, 59, 66, 69, 73, 75, 77, 99.

#### FUERTES.

FUERTES, J. H.—Admitted as Junior, 68, 100.

Fuller, F. L.—Admitted as Member, 65, 66.

FULTON, JOHN A.—Letter on Ambiguity of Engineering Titles, 3; Discussion on Proposed Amendments to Constitution, 12.

Gahagen, W. H.—Admitted as Junior, 85, 95.

GATES, C. L.—Discussion by, 77.

GAYLER, CARL.—Discussion on Proposed Amendments to Constitution, 10,

GERBER, EMIL.—Admitted as Member, 59, 60.

Gibson, William, Jr.—Admitted as Member, 85, 95.

GIESLER, E. A.—Remarks by, 104.
GILLMORE, GEN. Q. A.—Death an-

nounced, 66.

GLADDING, HENRY HOLBROOK. — Admitted as Member, 1, 58.

GOLDMARK, HENRY.—Admitted as Member, 72, 74; Discussion by, 76.

GOSLING, E. B.—Discussion by, 108. GOTTLIER, A.— Discussion on Proposed Amendments to Constitution, 12; Discussion by, 76.

GOULD, E. S.—Discussion on Proposed Amendments to Constitution, 23, 34, 37.

Gowen, C. S.—Admitted as Member, 61, 63.

Gray, William. - Admitted as Junior, 68, 70.

Green, Samuel M.—Elected Fellow, 95, 98.

Greene, D. M.—Discussion on Proposed Amendment to Constitution, 12.

Greene, E. A.—Admitted as Member, 82, 83.

Greene, George S.—Elected Honorary Member, 103.

Greene, G. S., Jr.—Elected Treasurer, 30; Discussion on Proposed Amendments to Constitution, 37; Presides at Meeting, 63; Discussions by, 59, 63, 69.

sions by, 59, 63, 69. Grimshaw, J. W.—Admitted as Member, 103, 105.

Hamilton, William G.—Presides at Meeting, 30; on Committee on Nominations, 82; Discussion by, 86.

#### HARDY.

Hardy, G. R. · Admitted as Member, 103.

Harris, R. L.—Discussions by, 59, 63, 66.

Hasbrouck, C. A.—Admitted as Junior, 61, 64.

HASLETT, SULLIVAN.-Bequest of Professional Books to the Society, 69.

Haupt, L. M.—Admitted as Member, 72, 74.

Haviland, Arthur. — Admitted as Member, 1, 58.

HAZLEHURST, G. B. — Admitted as Member, 59, 60.

Hegeman, A. B.—Admitted as Member, 59, 60.

Henry, D. Farrand.—Discussion on Proposed Amendment to Constitution, 15.

Herbert, A. P.—Admitted as Member, 85, 95.

Hering, R.—Offers Resolution, 38; Member of Committee to Urge Congress to Provide for Gauges for Rain-fall, 39.

Herschel, Clemens.—Discussion on Proposed Amendments to Constitution, 12.

HILDRETH, R. W.—Admitted as Junior, 1, 58.
HILL, J. W.—Paper by, 63; Discus-

sion by, 69.

Hodges, Arthur.—Admitted as Member, 68, 70.
Hoover, J. W.—Admitted as Member,

72, 74.
House, Bruce F.--Admitted as Mem-

ber, 65, 66. Howe, H. J.—Admitted as Junior, 68,

Howell, G. W.—Admitted as Member, 68, 70.

Howell, J. W.—Discussion by, 63. Hunt, C. W.—Discussion by, 99. Hutton, W. R.—Discussion by, 59.

Jackson, L. B.—Admitted as Member, 72, 74.

Jameson, C. D.—Admitted as Member, 61, 63.

ber, 61, 63.
Jenning, W. H.—Discussion by, 76.
Johnson, J. B.—Discussion by, 77.

JUDSON, WILLIAM P.—Discussion on Proposed Amendments to Constitution, 12.

Just, G. A.—Discussion by, 108.

Kastl, Alexander E.—Admitted as Junior, 1, 58.

#### KEEFER.

KEEFER, THOMAS C .- Elected President, 30; Discussion on Proposed Amendments to Constitution, 21; Presides at Meeting, 65; Annual

Address, 76.
Kelley, C. W.—Admitted as Member, 72, 74.

Kelley, F. M.—Discussion by, 66. Kent, E. B.—Admitted as Junior, 65, 67.

KINGMAN, LEWIS, - Discussion on Proposed Amendments to Constitution, 13.

KNIGHT, W. B .- Member of Committee on Nominations, 82.

Ковачаяні, Качаліво.—Admitted as Member, 59, 60.

Toragoro, -Admitted Kondo, Junior, 98, 100.

LANDOR, E. J.—Admitted as Member, 61, 64.

LANDRETH, W. B .- Admitted as Member, 98.

LANDRETH, O. H.—Discussion by, 77. LANT, F. P.—Admitted as Junior, 98. 100.

LATIMER, CHARLES. - Death announced,

LEDLIE, CHARLES H .- Admitted as Member, 1, 58.

LEVERICH, G. - Paper by, 77.

LEVINGS, CHARLES, -Admitted as Member, 98.

Lewis, E. W.-Admitted as Member, 68, 70,

Library, Books Bequeathed to, by S.

HASLETT, 69. Library, and Museum, Additions to, 89, 110,

LINDENTHAL, G.—Paper by, 1. LINDERFELT, Prof.—Address by, 77.

LOCKE, C. A.-Admitted as Member, 98, 100.

Locomotive, Account of First, on Philadelphia, Germantown and Norristown Railroad, 72.

Loree, L. F.—Discussion by, 76. Low, EMILE. - Admitted as Member, 68, 70.

Loweth, C. F.—Discussion by, 76. Lucas, D. J.—Admitted as Member,

LUNDIE, JOHN. -- Admitted as Member. 82, 83.

LYDON, WILLIAM, A .- Admitted as Junior, 1, 58.

MACDONALD, CHARLES. - Discussion by, 104.

#### MACFARLANE.

MacFarlane, James. - Admitted as

Member, 65, 66. Maclay, W. W.—Discussion by, 69.

MAGUIRE, E. E.—Paper by, 85.
MAGUIRE, EDWARD.—Admitted Member, 85, 95.

Maintenance Expenses of Wood and Metal Ties, 78.

Mason, A. J.—Admitted as Member, 85, 95.

Masten, C. S.—Discussion on Proposed Amendments to Constitution, 11.

McAlpine, William J. - Elected Honorary Member, 103.

McCLINTOCK, W. Member, 107. E.-Admitted as

McComb, David E.—Member of Committee to Urge Congress to Provide for Gauges for Rain-fall, 39.

McCullon, Walter.—Admitted as Junior, 82, 83.

McDonald, Hunter.-Admitted Member, 61, 64.

McMath, R. E.-Discussion on Proposed Amendments to Constitution, 8.

MERCUR, FRED. - Death announced,

MERRIMAN, MANSFIELD. - Discussions by, 75, 77.

MICHAELIS, O. E.—Discussions on Proposed Amendments to Constitution, 12, 37.

MILLER, A. M. -Admitted as Member, 72, 74,

MILLER, H. I.-Admitted as Member, 68, 70.

MILLS, A. L.-Admitted as Member, 68. 70.

Minutes of Annual Convention at Milwaukee, Wis., June 28th-July 4th, 1888. - First Session called to order by J. J. R. CROES, Vice-President; G. H. BENZENBERG elected Chairman of the Convention, 75; "Some Facts in Relation to Friction, Waste and Loss of Water in Mains," by C. B. Brush, read and discussed, 75.—Second Session, June 28th, Discussion on "Friction, Waste and Loss of Water in Mains," continued, 75; "English Railroad Track," by E. E. R. TRAT-MAN, read, 76.—Third Session, June 28th, Address by E. S. ELLIOT, with response by J. J. R. CROES, 76; Address by C. L. Colby, with response by J. M. Wilson, 76; Annual Address of President Thomas C. Keefer, read by Secretary, 76; resolution of condolence to President Keefer, 76. -Fourth Session, June 29th, "Destruction of Rails by Excessive Weights," by J. T. Dodge, read, and it and "English Railroad Track " discussed, 76; vote of thanks, on behalf of the ladies, tendered ladies of Milwaukee, 76. -Fifth Session, June 29th, phons of Water-works of Kansas City, by G.W. Pearsons, read and discussed, 76: "Some Observations on Improvement of Several of the Rivers of the Atlantic Coast," by W. P. Craighill, read, 76; Business Meeting of Convention held, 76; Reception at Athenæum to Members and guests, 76. -Sixth Session, June 30th; presentation of souvenir book by Mr. GOODRICH, and response by C. B. Brush, 77; discussion on Venturi Water Meter, 77; "High Walls or Dams to Resist the Pressure of Water," by J. B. Francis, read and discussed, 77; "Brick Industry about New York City," by Calvin Tomkins," "Note on Brick Making in Sinaloa, Mexico," by F. Sosa y Avela, "Slate Bricks," by J. R. Villalon, "The Manufacture of Brick near Chicago, by D. V. Purington, read and discussed, 77; Address on Volapük, by Professor LINDERFELT, 77; visits made to works of E. P. Allis, shops of C., M. and St. P. Ry., and to works of Milwaukee Cement Co., 77.—Seventh Session, July 2d, "Weights of Bridge Trusses," by A. J. Du Bois, read, 77; "An Investigation to Determine Strains in a Hollow Castiron Disk, Cooled from the Interior," by G. Leverich, read, 77; "The Panama Canal," by W. P. WILLIAMS, read, 77; W. P. WILLIAMS, read, 77; "Method Used for Moving Brighton Beach Hotel," by J. R. WARDLAW, read, 77; discussion on "Inspection and Maintenance of Railway Structures," and on "Inspectors and Bridge Work," 77; "Z-Iron Columns," by C. L. STROBEL, read and discussed, 78; "Maintenance Expenses of Wood and Metal Railroad Ties," by J. W. Post, read and discussed, 78; votes of thanks to Woman's Club of Wisconsin, to Citizens of Milwaukee, to Local Committee, to G. H. BENZENBERG, to D. J. WHITTEMORE, to E. P. ALLIS & Co., to C., M. and St. P. Ry., and to Milwaukee Cement Company, 78.—Tuesday, July 3d, Excursion to Appleton and Kaukauna to inspect pulp and paper mills and electric street railway, 78. Wednesday, July 4th, visit to Oconomowac, 79; Members in attendance, 79.

Minutes of Meetings of the Board of

Tirection, 43, 73, 86, 99, 108.

—January 4, 1888, Application considered; report of sub-committee on Professional Training and Technical Education presented; Appropriations made, 43.

January 14, 1888, Secretary's Annual Report considered, amend-

ed and adopted, 43. -January 19, 1888, Standing Committees on Finance and on Library appointed, 43.

-February 1, 1888, Applications considered; business transacted, 73.

- March 8, 1888, Applications considered; business transacted, 73. April 15, 1888, Applications considered; Committee on Details of

Convention appointed, 73. May 3, 1888, Applications considered; time for holding Convention discussed, 73.

-May 15, 1888, proposition for sale of Transactions to Societies, etc., discussed; business transacted, 73.

June 7, 1888, Applications con-sidered; arrangements for Con-vention discussed; form of circular regarding publications prepared, 73.

June 27, 1888, Details as to Convention perfected, 73.

August 1, 1888, Applications considered, 86.

September 6, 1888, Applications considered; business transacted; Board of Censors to award Norman Medal appointed; Committee to award Rowland Prize appointed, 86.

4, 1888, Appropriations made; applications considered; nominations of Honorary Members presented; business transacted, 99.

ovember 8, 1888, Applications considered; business transacted; November communication in regard to depositing badge of the Society in Numimismatic Collection of National Museum considered, 108.

December 6, 1888, Applications considered; appropriations made; communication in regard to visit to Europe considered; enlargement of Society House considered,

108.

December 17, 1888, Applications considered; letter from Society of Arts of London read; subject of Society Quarters considered and Committees appointed, 108.

Minutes of Meetings of the Society, 1 2, 59, 61, 63, 65, 66, 68, 69, 72, 73, 80, 82, 85, 98, 99, 103, 104, 107.

January 4, 1888, Ballots canvassed; "North River Bridge Problem," with discussion on Long Span Bridges, read by G. LINDENTHAL;

same discussed, 1.

-January 18, 1888, Annual Meeting, 2; Annual Reports of Board of Direction, of Treasurer, of Finance Committee, read, 2; Milwaukee determined upon as place for next Convention, 2; reports of Special Standing Committee on Uniform Standard Time, and of Special Standing Committee to Consider a Plan for Creating a Library for Joint Use, read, 2; report of Committee to Consider Proper Relations to Each Other of the Sections of Railway Rails and Wheels, read, 3; discussion on grades and titles of Engineers and appointment of Committee on same, 3, 4; discussion on proposed amendments to Constitution, 4-29, 30-41; report of canvass of ballot for officers, 29, 30; paper on Panama Canal, by C. C. Rogers, read, 41; visit on January 19 to bridge in construction over Harlem River, 41; reception at Society House, 41; members in attendance, 41; report of Board Direction, 44; of Treasurer, 50; of Committee on Finance, 53; on Uniform Standard Time, 54.

-February 1, 1888, Ballots canvassed, 59; Deaths of FRANK BERESFORD, CHARLES H. FISHER and FREDERICK MERCUR announced, 59; paper on Potomac River Dam, by S. H. CHITTENDEN, read and discussed,

-February 15, 1888, Paper on Railroad Accounts and Analysis of Railroad Rates, by GRATZ MOR-

DECAI, read, 59.

-March 7, 1888, Ballots canvassed, 61; vote on proposed amend-ments to Constitution canvassed, 61; award of Norman Medal, 62; award of Rowland Prize, 63; "Test of an Edison Incandescent Electric Lighting Plant," by J. W. Hill, read and discussed, 63. —March 21, 1888, Death of Squire

Whipple announced, 63; description of 30-inch wooden conduit, by Edward Prince, read and discussed, 63; "Durability of Tim-

ber," discussed, 63.

April 4, 1888, Ballots canvassed, 65. Deaths of George W. Cass, W. A. G. EMONTS, CHARLES LATIMER, announced, 65; "Sap in Trees in Winter," by J. F. Flagg, read, 65; statement of progress on Panama Canal, by R. K. WRIGHT, and discussion, 66.

April 18, 1888, Deaths of General Q. A. GILLMORE and GEORGE AINSLIE announced, 66; papers on Manufacture of Brick near Chicago, by D. V. Purington, and of Slate Brick, by J. R. VILLALON, read

and discussed, 66.

-May 2, 1888, Ballots canvassed, 68; bequest of books, by will of Sur-LIVAN HASLETT to Society, announced, 69; discussion on Electric Lighting Plant, 69; "Some Data as to Sewage Disposal," by J. Nimo, Jr., read, 69.

-May 16, 1888, Death of H. F. WALannounced, 69; "High LING Walls or Dams, to Resist the Pressure of Water," by James B. Francis, read and discussed, 69.

June 6, 1888, Ballots canvassed, 72; Death of W. L. BAKER announced, 72; "First Locomotive on Philadelphia, Germantown and Norris-

town Railroad," read, 72.

—June 20, 1888, "Automatic Waste
Weir," by A. D. Foote, read and

discussed, 73.

#### MINUTES.

-June 29, 1888, Business Meeting during Annual Convention, 80; Committee on Uniform Standard Time, continued, 80; Committee on Compressive Strength of Cements, etc., continued, 81; Committee on Proper Relations to each other of the Sections of Railway Wheels and Rails, continued, 81; report of Committee on Grades and Titles of Engineers referred back to Committee to perfect, 81; Committee on Nominations appointed, resolution in regard to preliminary circulation of reports of Standing Committees, 82.

-July 14, 1888 (adjourned session), Ballots canvassed, 82.

—September 5, 1888, Ballots canvassed, 85; report of Committee on Grades and Titles of Engineers presented, 85; "Theory of Aqua Ammonia Engines," by E. E. Ma-GOVERN, read, 85.

-September 19, 1888, Discussion on Improvement of Several of the Rivers of the Atlantic Coast, 86.

October 3, 1888, Ballots canvassed, 98; election of Samuel M. Green as Fellow announced, 98; death of James L. Randolphannounced, 98; "The New Transfer Bridge at Harsimus Cove, Jersey City," by J. A. Bensel, read and discussed, 98; "Experiments on Stability of Bench Marks," by G. W. Cooley, read and discussed, 98; written discussion on "Improvement of Several Rivers of the Atlantic Coast," by C. P. E. Burgwyn, read, 99.
October 19, 1888, Report of Nomi-

-October 19, 1888, Report of Nominating Committee read, 99; "The Construction of the Sweetwater Dam," by James D. Schuy-Lee, read and discussed, 99.

LER, read and discussed, 99.

November 7, 1888, Ballots canvassed, 103; transfer to Honorary Membership of J. W. Adams, W. J. McAlpine and G. S. Greene announced, 103; report of Committee to consider resolution offered by Committee on Uniform Standard Time, 103, 104; discussion on report of Committee on Proper Relations to each other of Sections of Railway Wheels and Rails, 104; paper on

# MINUTES:

"Time Reform," 104; "Method of Determining Angles of Railroad Turnouts," 104.

-November 21, 1888, Paper and discussion on "Construction of Bridge over Arkansas River at Van Buren, Ark.," 104.

December 5, 1888, Ballots canvassed, 107; letter on European trip, 107; death of S. B. CUSHING and H. W. B. PHINNEY announced, 107; paper and discussion on "English and American Railroads Compared in Operating Expenses," 107.

December 19, 1888, Letter from Society of Arts of London on European trip, 108; "Results of Some Experiments on Action of Teredo on Woods Preserved in Different Ways," read and discussed, 108; "Description of Lift Bridges on the Canals of the State of New York," presented and discussed, 108.

Montfort, Richard.—Admitted as Member, 72, 74.

MOORE, ROBERT.—Elected Vice-President, 30; Discussion on Proposed Amendmants to Constitution, 21, 25; on Committee on Amendments to Constitution, 38; Discussion by, 77.

Mordecai, Gratz.—Paper by, 59.
Morris, Gouverneur.—Admitted as

Member, 98.

MOULTHROP, GEORGE E.—Admitted as Member, 59, 60.

Moving Brighton Beach Hotel— Method used, 77.

MUHLENBERG, LEWIS.—Admitted as Member, 72, 74. Myers, E. T. D.—Admitted as Mem-

ber, 68, 70.

Myers, E. T. D., Jr.—Admitted as Junior, 68, 70.

Nash, C. H.—Admitted as Member,

Nelles, G. T.—Admitted as Member, 98, 100.

Nichols, N. J.—Admitted as Member, 107.

Norman Medal—Award of, 47, 62. North, E. P.—Remark in discussion on Proposed Amendments to Constitution, 21; Discussions by, 69, 107. No

Off

Osi

Par Par Par

PEA PEN PHD

Post Poto

PHI

Port Port Pown

PRATE STATE OF THE PRICE PRICE

Prince Purd o

Purin Railro

Railro

Rails,

## NORTH.

North River Bridge Problem, by G. LINDENTHAL, 1.

ODELL, F. S.—Discussion by, 99. Officers elected, 30.

OLNEY, G. R .- Admitted as Member. 61, 64,

OSBORN, F. C .- Admitted as Member, 98, 100,

OSTRANDER, J.E. -- Admitted as Junior, 68, 71.

PAINE, WILLIAM H.—Discussion on Proposed Amendments to Constitution, 19.

Panama Canal, 41, 66, 77.

Parsons, W. B.—Discussion by, 99. PATTEN, H. B.—Admitted as Member,

1, 58. Pearsons, G. W.—Discussion by, 75; Paper by, 76.

Penny, W. W.—Admitted as Junior, 65, 67.

Philbrick, E. S.—Discussion on Proposed Amendments to Constitution, 11.

PHINNEY, H. W. B .- Death announced, 107.

Porter, A. H.—Admitted as Junior, 82, 83.

Post, J. W.-Paper by, 78.

S

1-

as

er,

er,

er,

ion

on-

69,

Potomac River Dam, Paper by S. H. CHITTENDEN, 59.

POTTER, ALEXANDER.—Admitted as

Junior 1, 58.
Potter, H. W.—Admitted as Member, 107, 109.

Powell, C. F.-Admitted as Member,

PRATT, M. D.-Admitted as Junior. 85, 95, E.—Admitted as

PRENDERGAST, F. Member, 61, 64. PRICE, P. M.-Admitted as Member,

68, 70, PRINCE, EDWARD. -Paper by, 63.

Purdon, C. D.-Letter on Ambiguity of Engineering Titles, 3; Paper by, 104. Purington, D. V.—Discussion by, 77.

Railroad Accounts, Classification of, and Analysis of Railroad Rates, by GRATZ MORDECAI, 59.

Railroads, English and American, Compared in Operating Expenses,

Rails, Destruction of, by Heavy Weights, 76.

### RANDOLPH.

RANDOLPH, B. S .- Admitted as Member, 68, 70.

RANDOLPH, JAMES L.—On Committee on Grades and Titles of Engineers, 4; Discussion on Proposed Amendments to Constitution, 12.

RANDOLPH, JAMES L.—Death announced, 98.

Report of Board of Direction, 2, 44. Report of Committee to consider Resolution offered by Special Com-Uniform Standard mittee on Time, 103.

Report of Committee on Grades and Titles of Engineers, 85, 87.

Report of Committee on Nominations,

Report of Committee on Proper Relations to each other of the Sections of Railway Wheels and Rails, 3; Discussion on, 104.

Report of Committee to put in Proper Form for Letter-ballot Proposed Amendments to Constitution, 39.

Report of Finance Committee, 2, 53. Report of Special Committee on Uniform Standard Time, 2, 54, 83.

Report of Special Standing Committee on Library, 2, 3.

Report of Treasurer, 2, 50. Resolution of Condolence to Thomas

C. Keefer, 76. Rich, W. W.—Discussion by, 76. Rickon, F. J. H.—Admitted as Member, 1, 58.

RIDGEWAY, ROBERT.—Admitted Member, 59, 60.

RIFFLE, Franklin. -- Admitted Member, 103, 105.

Rivers of Atlantic Coast-Some Observations on Improvement of, 76.

ROBERTS, P., JR.-Discussion on Proposed Amendments to Constitution, 28, 29; discussion by, 76.

Robinson, Albert A.—On Committee on Grades and Titles of Engineers, 4.

Robinson, G. H .- Admitted as Member, 61, 64.

Rodd, Thomas. - Discussion by, 76. Rogers, A. B.-Member of Committee on Nominations, 82.

Rogers, C. C.—Paper by, 41.

Rose, C. C.—Admitted as Member, 65,

ROSECRANS, GEN. W. S. - Discussion on Proposed Amendments to Constitution, 15.

#### ROWLAND.

ROWLAND, C. B.—Admitted as Junior, 68, 71.

Rowland Prize—Award of, 47, 63.
RUMBLE, WILLIAM.—Discussion by,
108.

Russell, N. E.—Admitted as Member, 98.

Sap in Trees in Winter, by J. F. Flagg, 65.

SCHERZER, WILLIAM.—Admitted as Member, 85, 95. SCHUYLER, J. D.—Paper by, 99.

SEAMAN, HENRY B.—Remark on Proposed Amendments to Constitution, 13; Discussion by, 77.

Sewage Disposal, Some Data, prepared by Joseph Nimo, Jr., 69. Sewall, J. S.—Discussion on Pro-

posed Amendments to Constitution, 14.

SHALER, I. A.—Admitted as Junior, 82, 83.

Shanks, T. P.—Admitted as Member, 68, 70.

Siphons for Water-works of Kansas City, 76.

SKINNER, F. W.—Discussions by, 63, 76, 99.

SMITH, BENJAMIN B.—Admitted as Member, 103, 105.

SMITH, E. R.—Admitted as Junior, 68,

SMITH, I. A.—Admitted as Member, 98.

SMITH, OBERLIN.—Discussion by, 75, SOSA Y AVELA, DON F.—Paper by, 77. SPEED, JAMES B.—Admitted as Associate, 68, 70.

STAIR, W. H.—Admitted as Junior, 69,

Stearnes, F. P.—Member of Committee on Nominations, 82.

Stevens, H. E.—Admitted as Member, 65, 67.

Stevens, J. F.—Admitted as Member, 72, 74.

STEWART, JOHN MUIRHEAD.—Admitted as Member, 1, 58.

STONE, E. H.—Admitted as Member, 107.

STOWELL, C. F.—Admitted as Member, 65, 67.

Strains in a Hollow Cast-iron Disk, to Determine, 77.

STRIEDINGER, J. H.—Discussion by, 99.
STROBEL, C. L.—Paper by, 77.

## STUBBS.

Stubbs, L. W.—Admitted as Member, 98, 100.

Wa

WE

WE

WE

WE

 $W_{\mathbf{E}}$ 

WH

WH

WH

WH

WH

WH

WIG

Student Grade of Membership, see "Constitution, Amendments Proposed, Discussion on."

Sweetwater Dam, On Construction of, 99.

Swift, Alexander J.—Admitted as Member, 59, 60.

TACHARD, A. P.—Admitted as Junior, 72, 74.

Talbot, A. N.—Admitted as Member, 65, 67.

Teredo, Action of, on Woods Preserved in Different Ways, 108. THOMPSON, G. M.—Admitted as Member, 68, 70.

Thomson, T. K.—Admitted as Junior,

Tibbals, G. A.—Admitted as Junior, 69, 71.

Tibbals, S. G.—Admitted as Junior, 69, 71.

Time Reform, 104.
Tomeins, Calvin.—Discussion by, 66;

Paper by, 77.
Towle, Stevenson.—Elected Director, 30; on Committee on Finance, 43.

TRATMAN, E. E. Russell.—Paper by, 76; Discussion by, 78.

TRAUTWINE, J. C., Jr.—Admitted as Associate, 107.

TRIBUS, L. L.—Admitted as Junior, 65, 67.

TUTHILL, Job.—Admitted as Junior, 72, 74.

VILLALON Y SANCHEZ, José R.—Admitted as Junior, 82, 83; Paper and discussion by, 66.
Volapük, 77.

VOORHEES, THEODORE.—Discussion by, 107.

Walling, H. F.—Death announced,

Walls, High, or Dams, to Resist the Pressure of Water, by J. B. Francis, 69.

WARDER, J. H.—Admitted as Associate, 61, 64.

WARDLAW, J. R.—Paper by, 77. WASHBURN, F. S.—Admitted as Member, 103, 105.

# WATER.

Water, Some Facts in Relation to Friction, Waste and Loss of, in Mains, 75.

Wegmann, Edward, Jr.—Admitted as Member, 61, 64; Discussions by, 69, 99.

Weinhagen, Frederick.—Admitted as Member, 82, 83.

Weiskopf, S. C.—Admitted as Member, 107.

Wellington, A. M.—Discussion on Proposed Amendments to Constitution, 17, 26, 36; on Committee on Amendments to Constitution, 38.

Wentworth, C. C.—Admitted as Member, 65, 67.

Wheeler, H. R.—Admitted as Junior, 65, 67.

Whinery, Samuel.—Discussion by, 63.

Whipple, Squire.—Death announced, 63.

Whistler, T. D.—Admitted as Member, 68, 70; Discussion by, 69.

White, W. H.—Discussion on Proposed Amendments to Constitution, 26.

Whittemore, D. J.—On Committee on Grades and Titles of Engineers, 4; Discussion by, 78.

e,

y,

as or, or,

d-

by,

the

lem-

Wightman, W. H.—Admitted as Member, 85, 95.

## WILLIAMS.

WILLIAMS, W. P.—Paper by, 77.

Wilson, A. O.—Admitted as Member, 61, 64; Discussion by, 86.

Wilson, E. H.—Admitted as Member, 59, 60.

WILSON, HENRY W.—Remark on Proposed Amendments to Constitution, 13.

WILSON, JOHN A.—Discussion on Proposed Amendments to Constitution, 13.

WILSON, JOSEPH M.—Elected Director, 30; Remark on Proposed Amendments to Constitution, 13; on Committee on Library, 43.

Committee on Library, 43.

WISNER, GEORGE Y.—Discussion on Proposed Amendments to Constitution, 16.

Wood, C. F.—Admitted as Junior, 107.

WORTHEN, WILLIAM E.—Preside Meeting, 1, 2.

WRIGHT, GEORGE F.—Admitted as Member, 1, 58,

WRIGHT, R. K.—Informal Remarks on Panama Canal, 66; Discussion by, 66.

YORK, H. W.—Admitted as Junior, 69, 71.

Young. John.—Admitted as Member, 61, 64.